Direct Control System

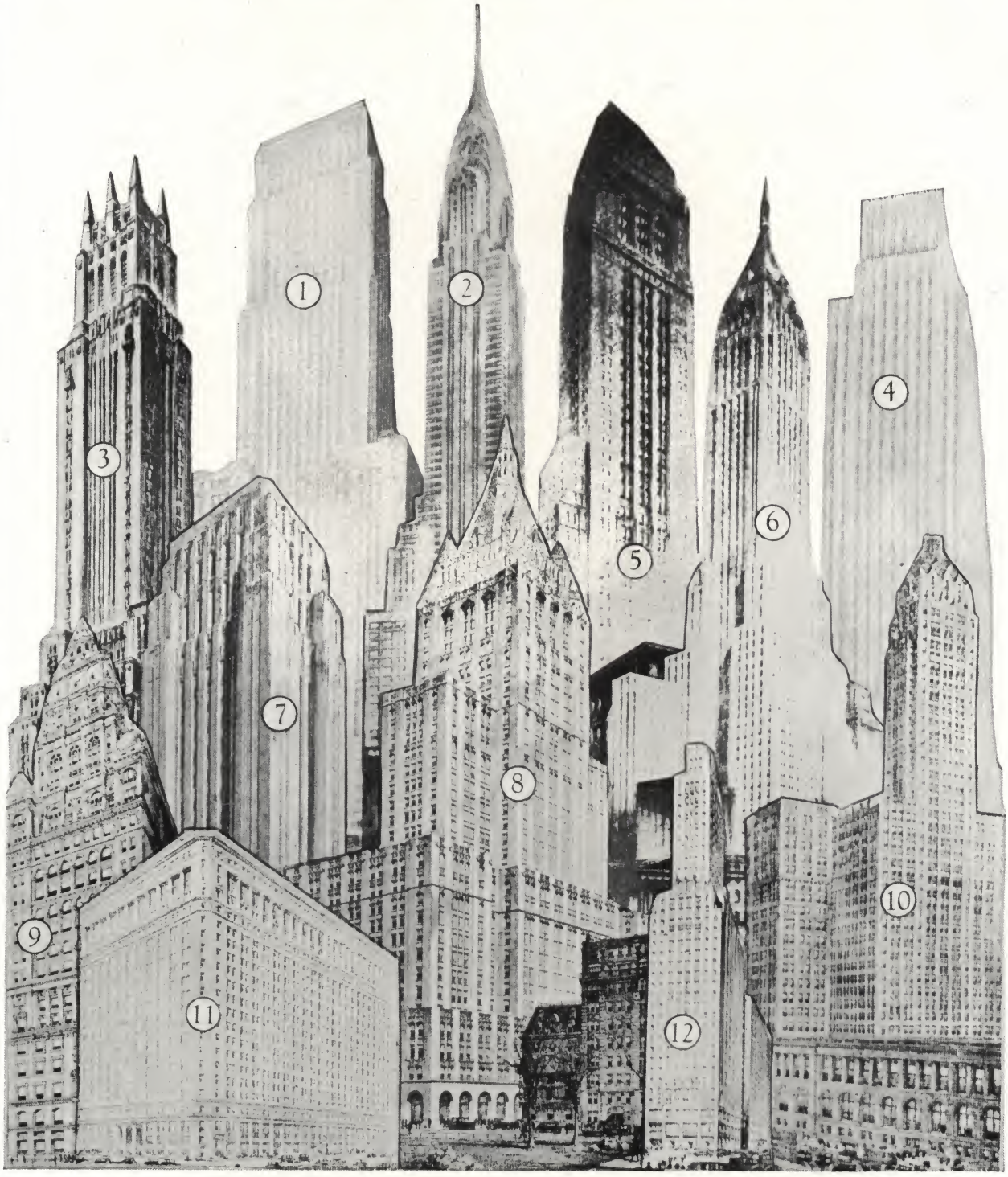


AUTOMATIC TEMPERATURE REGULATION

DIRECT CONTROL VALVE COMPANY

CHICAGO, ILLINOIS

CONCENTRATED EVIDENCE



1. Number One La Salle Street Building, Chicago, Ill.
2. Chrysler Building, New York, N. Y.
3. Lefcourt Colonial Building, New York, N. Y.
4. Daily News Building, New York, N. Y.
5. 10 East 40th Street Building, New York, N. Y.
6. Bank of Manhattan Building, New York, N. Y.
7. Rand Building, Minneapolis, Minn.
8. New York Life Building, New York, N. Y.
9. Central Union Trust Building, New York, N. Y.
10. Pittsfield Building, Chicago, Ill.
11. New Insurance Exchange Building, Chicago, Ill.
12. Willoughby Tower, Chicago, Ill.

DIRECT CONTROL VALVE COMPANY

Manufacturers of Thermostatic Control Devices

GENERAL OFFICES

8 South Michigan Boulevard
CHICAGO, ILL.

DISTRICT SALES OFFICES

NEW YORK, N. Y.	WASHINGTON, D. C.	PHILADELPHIA, PA.	ATLANTA, GA.	MINNEAPOLIS, MINN.
ALBANY, N. Y.	ROCHESTER, N. Y.	PITTSBURGH, PA.	NEWARK, N. J.	MILWAUKEE, WIS.
RALEIGH, N. C.	WATERLOO, IA	OKLAHOMA CITY, OKLA.	BOSTON, MASS.	CHARLESTON, S. C.
DETROIT, MICH.	DES MOINES, IA.	SAN FRANCISCO, CAL.	LITTLE ROCK, ARK.	VANCOUVER, B. C.
TORONTO, ONT.	MONTREAL, QUE.	SEATTLE, WASH.	TULSA, OKLA.	LOUISVILLE, KY.

Products

THERMOSTATIC RADIATOR CONTROL VALVES, automatically controlling room temperature.

The Company

The DIRECT CONTROL VALVE COMPANY was founded in 1927 and is incorporated under the laws of Delaware. It has established a financial standing and reputation sufficient to guarantee its integrity and responsibility, and to assure efficient and dependable service.

Manufacturing

The company's product is manufactured at Milwaukee, Wisconsin, the plant having ample brass foundry, machine shop and assembly facilities for the company's requirements. The modern research laboratory, in a separate building, is equipped to carry on the experimental and research work on the company's products and their uses.

Sales and Service

The sales organization consists of experienced sales engineers, familiar with the heating industry and thoroughly equipped by experience to intelligently handle any sales problems pertaining to the application of the company's products.

An important part of the organization is the Service Department with an unusually high-calibered personnel to render efficient service.

Continued on next page

STEAM ECONOMY AND SATISFIED OCCUPANTS BY TEMPERATURE REGULATION

During recent years the term "Steam Economy" has been constantly misunderstood and misused by the heating industry. Steam saving is not always an economy and should be studied from the viewpoint of its economic effect on the other phases of building operation.

Fundamentally, steam economy in any building is secondary to the fact that you must heat the building to the complete satisfaction of the building occupants. This occupancy requirement for heat, which influences the degree of heat furnished and the heating hours, will vary with the nature of the occupancy and the result in heat demand will vary from day to day independent of climatic conditions—resulting in a building requirement that is not consistent throughout the heating season.

Demands for heat of the individual building occupants must be satisfied before any attempt is made to save steam, for it would offer little profit to the building owner to decrease the steam consumption to the extent of creating dissatisfied occupants or tenants.

For
THE OWNER

Automatic temperature control makes space, whether office or apartment, more rentable. It also saves fuel to an extent little understood by either building owners or operators

We consider that the heating requirement in any building is made up of a number of separate and variable human requirements and, of course, is further influenced by the natural variation in climatic and atmospheric conditions. The human requirements together with the climatic conditions determine the heat demand of any building and, because of the variation that exists in the above factors influencing accordingly the heat demand, it is not feasible to operate a building on the basis of a predetermined or fixed building temperature.

The Direct Control Valve offers to the operator the opportunity of heating the building to the minimum temperatures tolerated by the building occupants and at the same time, while satisfying the occupancy demand, the Direct Control Valve automatically compensates for variations in climatic conditions. The Direct Control Valve offers the maximum in steam economy consistent with the theory that the building must be heated satisfactorily.

When we study the factors that make up the heat demand in your building, it is agreed that the human element,

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or the occupancy factor, is an item over which we have little control. We know that the demand for heat originating from any one occupant will vary from day to day and that the daily variations in heat demand by individual building occupants will not coincide with each other. We know in addition to this that we have no control over the climatic or atmospheric conditions which affect the heat demand in a building. It appears then that the logical method to use in effecting maximum economy in steam consumption is to install such equipment as will enable the building to maintain each heated space in the building at the minimum temperature that will be demanded by the space occupant on that particular day. Any steam savings beyond this point represents under-heating and any steam consumed in excess of this point represents waste. The only known method to promote this condition is to control the heat in-put to each individual space in the building consistent with the minimum temperature required by the occupant of that space. This can only be accomplished by the use of a device which will be flexible enough to guarantee to the individual space occupant the degree of control over the radiation in that space necessary to satisfy his variable demand for heat.

To effect the maximum in steam economy you must then accurately control the room temperatures throughout the building. In order to maintain all spaces in the building at minimum allowable temperature it is necessary to install such equipment as will actually maintain each individual space in the building within one degree of a predetermined temperature. The most economical and most efficient method of securing the above result is by the use of the Direct Control Valve.

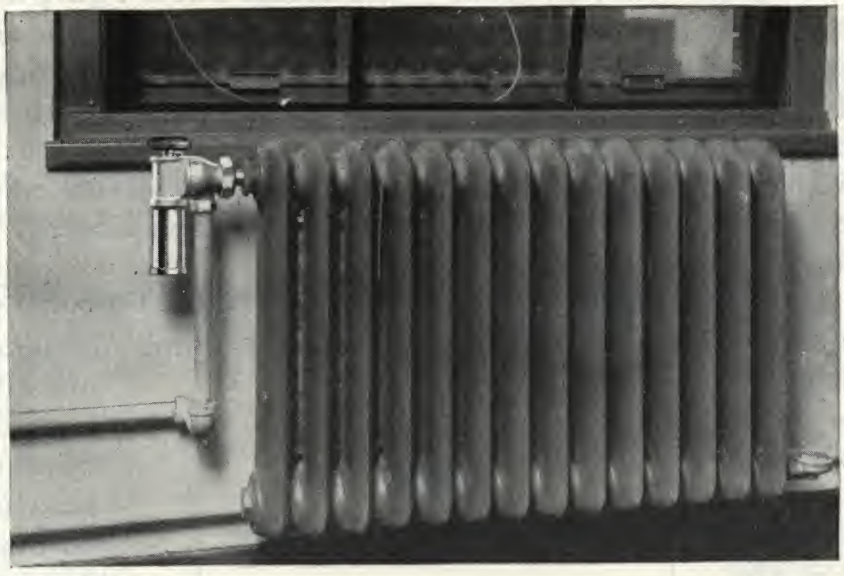
For THE TENANT

Automatic temperature control makes rooms far more comfortable and healthier. It also makes workers more efficient by eliminating high enervating temperature

Direct Control Valves

1. Control room temperature within one degree Fahrenheit of any predetermined temperature between 60 degrees and 80 degrees Fahrenheit.
2. Offer the tenant the option of closing the radiator valve by hand.
3. Make it impossible to over-heat the room.
4. Require no air lines, piping, electrical connections, or other outside or auxiliary equipment.
5. Allow changing of radiator locations without tearing out plaster, tile, trim, etc.
6. Conserve all of the steam possible after satisfying the heat demands of the building occupants.
7. Guarantee minimum maintenance cost.
8. Increase the rental value of your building by offering temperature control with resultant room comfort, better working conditions, with increased efficiency and added health.

Continued on next page



The value on the radiator is the entire temperature control. It is easily installed, and requires no outside attachments of any kind.

THE DIRECT CONTROL SYSTEM OF AUTOMATIC TEMPERATURE REGULATION AND STEAM ECONOMY

Other Methods of Heat Control

Other methods of heat or temperature control necessitate the use of costly pneumatic systems which involve high maintenance costs or the use of some of the newer partial control devices now offered on the market. All of these devices operate on the principle of restricting heat furnished rather than regulating it, and accordingly violate the principle that your first requirement is to heat the building.

The Direct Control System

The Direct Control System merely involves the attachment to each radiator of a direct control unit. Each direct control unit is a self-contained automatic regulating device which *satisfies the demand of each room occupant for heat but prevents the waste of steam beyond that point.*

Installation

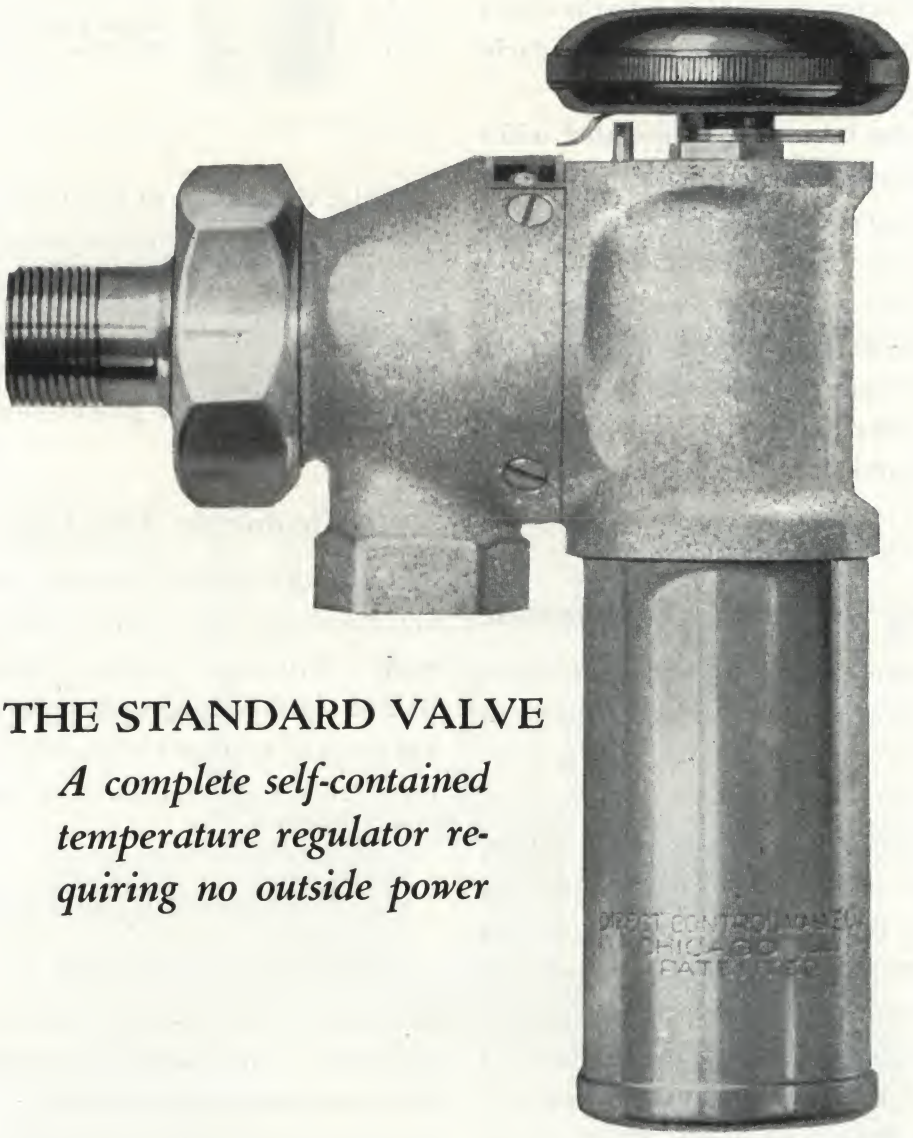
The direct control valve is installed in the same manner as any ordinary radiator valves and adds nothing to the installation cost over the usual hand valve.

The direct control valve does not involve the use of air lines, electrical connections, etc., and being self-contained, is always available for inspection and adjustment.

Continued on next page

The Most Economical of all Control Systems

The greatest advantage of the direct control valve is its economy. It reduces installation cost enormously, costing no more to install than a simple hand valve. It does away with maintenance cost entirely. It involves but a fraction of the cost of pneumatic systems. This, coupled with its remarkable savings in fuel cost, enables the Direct Control System to repay the investment involved, in a very brief period of time—usually about three years. After this the fuel economies effected are pure saving.



THE STANDARD VALVE

A complete self-contained temperature regulator requiring no outside power

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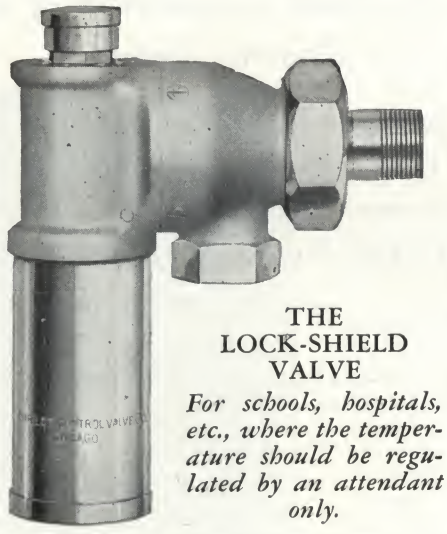
Maintains Even Temperature

Direct Control Valves are installed with the guarantee to maintain the temperature of the room to within one degree of the required point. The degree of temperature at which the room is to be maintained may be changed, by a minor adjustment, by turning the valve wheel, to eight degrees above or below the point at which the valve is originally set. Upon request it is made with a key or lock shield so it can be adjusted only by the person holding the operating key. This type of valve is particularly suited to schools and institutions.

The valve can be manually operated without the thermostat. In new buildings it can therefore be installed without the thermostat, and operated as a hand valve until the building is ready for occupancy, when the thermostat can be attached. Should occasion arise the thermostat can be removed without removing the valve or shutting off steam from the radiator, and the valve can be manually operated.

Modulating in Action ~ Hydraulic

The valve is operated by a thermostat which is strictly hydraulic (not gas and liquid) in principle and very powerful, tested to a minimum pressure of 2500 lbs. to the square inch. Hydraulic pressure—the tremendous expansion force of a liquid when heated—makes the thermostat positive in action and gives the valve a constant power always adequate to seat the valve and assure its successful operation. The thermostat once filled and sealed is never affected by evaporation or leakage, or by structural fatigue of metal. The valve is protected against excessive temperatures by a relief spring.



THE LOCK-SHIELD VALVE

For schools, hospitals, etc., where the temperature should be regulated by an attendant only.

While the action of the valve is therefore absolutely positive, yet the valve is graduated or modulating in action, not of the all on or all off type. This avoids extreme radiator temperatures and assures the greatest possible heat utilization for a given amount of steam.

Applicable to Two-Pipe Systems

The Direct Control Valve may be applied to any building, new or old, which is equipped with a two-pipe vacuum, vapor, or atmospheric, steam heating system. Any good standard make of vacuum radiator trap may be used on a radiator in combination with the valve.

Constructed for Years of Trouble-free Service ~ Packless

The valve is constructed for long life. It is packless. It will stand use and abuse, and deliver a practically indefinite period of service. The assembly drawings show its substantial construction. Parts are few, strong and durable.

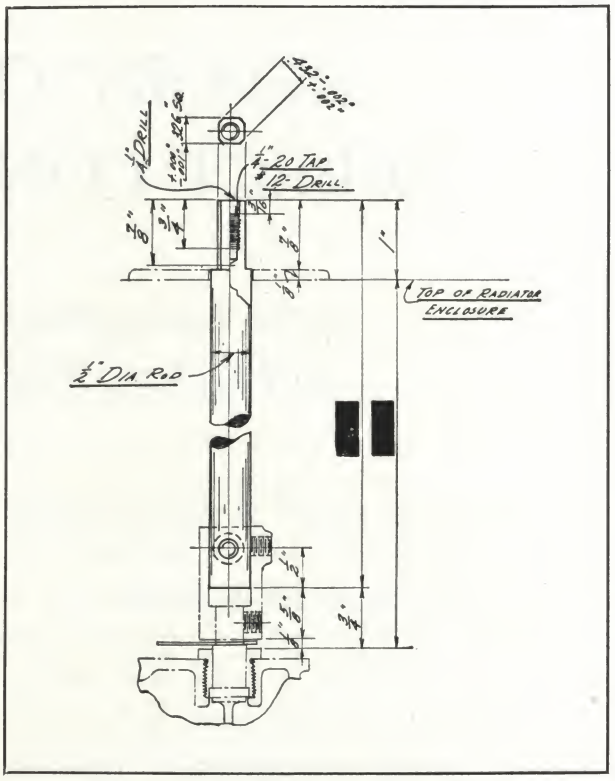
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Tried and Proved

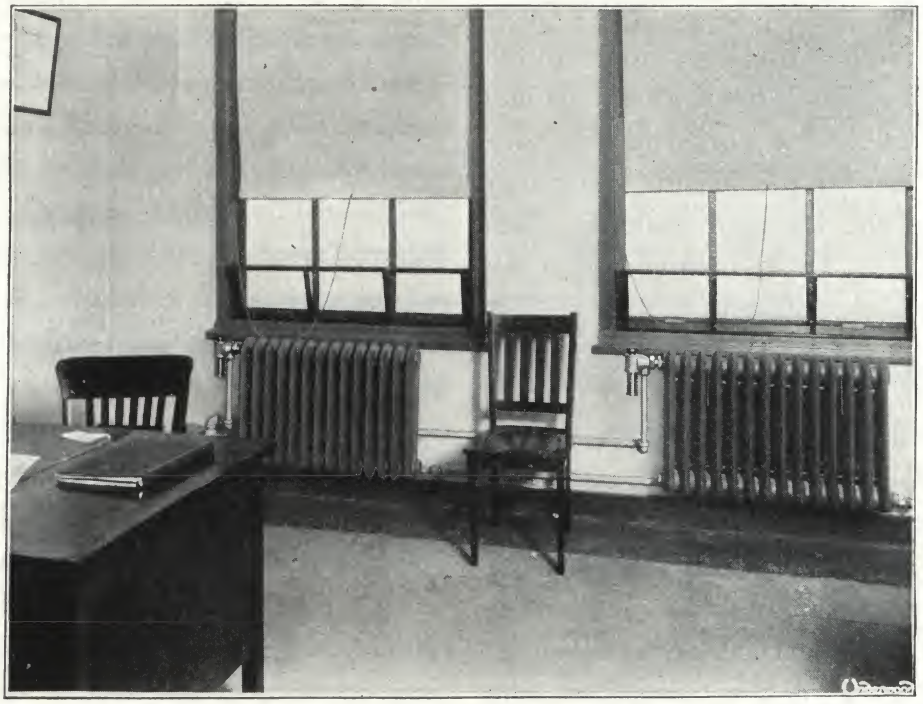
The Direct Control System of Automatic Temperature Regulation is not an experiment. It has been severely tested for a period of over six years. Direct Control Valves are used and specified by all of the outstanding architects and engineers in the United States and Canada. Its use is not limited to large office buildings, but to schools, hospitals and all buildings of all types and sizes.

Where the heating system is satisfactory it can be as easily installed in an old building as in a new one.

Thorough investigation by any architect, contracting engineer or owner will show not only that it is the most economical and reliable form of room temperature control, but that it may profitably be installed in many buildings where any other form of temperature control is out of the question.



Standard Extension Handle for Use on Enclosed Radiators



Direct Control Valves on radiators in an office building. The temperature of the entire room is automatically regulated by the valves.

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REPORT ON TEST OF DIRECT CONTROL VALVES

By the Investigating Committee of Architects and Engineers, May 1, 1928, to June 1, 1930

As the result of a request of several members of the American Institute of Architects, in 1927, to the Investigating Committees of Architects and Engineers, for a report on the Direct Control Valve, a committee was appointed to investigate this valve, and to determine its reliability as a means of regulating room temperatures under varying outdoor temperatures and operating conditions. This committee, known as the Investigating Committee of Architects and Engineers, visited the plant of the Direct Control Valve Company and made other investigations as to the general construction of the valve and its mechanical fitness for the work and also conducted tests during the heating season of 1927-1928 at the Pittsfield Building, Central Life Building, Stevens Hotel, and at the Pure Oil Building, Chicago.

Tests Show Commercial Operation

These tests indicated to the satisfaction of this committee that the Direct Control Valve gave temperature regulation well within commercial requirements when installed on two-pipe vacuum systems and in accordance with the recommendations of the manufacturer. The findings of the Committee were published in a report of the Investigating Committee of Architects and Engineers.

Condensation Tests

Near the end of the heating season of 1928, a test was made to determine the difference in condensation between radiators equipped with hand control valves and those equipped with Direct Control Valves. Two adjacent sets of risers, each set consisting of a supply and return, were selected in the Pure Oil Building. The amount of radiation on each supply riser was the same. The radiators on one set of risers were equipped with hand control valves and on the other set of risers with Direct Control Valves. The amounts of condensation for each set of risers was measured by condensation meters. While this test indicated considerable saving in favor of the Direct Control Valve, the Committee felt it was conducted for too short a period of time to supply reliable information. It was the opinion of the Committee that valuable information could be obtained if tests were conducted for at least another heating season and accordingly arranged to make tests on eight office buildings in Chicago for the purpose of measuring the condensation from the direct radiation. The condensation from fan heaters and domestic water heaters was measured independently.

It was the purpose of this test to obtain as

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accurately as possible, the amount of steam required per square foot of radiation in buildings of this class. In the past, condensation records from various types of heating systems have been taken and have been tabulated for various purposes—in general, these have shown the total amount of condensation for all services, or, they have been made in single buildings under varying conditions to determine the economies which might be effected by changes in methods of operation. Very little data has been obtained which would show a comparison between the amounts of steam required for direct radiation in buildings similar in character and where they were operated under normal conditions, using the equipment and operating forces as found. The Committee felt that accurate measurements of the amounts of steam required under these conditions would be valuable to the architectural and engineering professions, as well as to the building owners and managers.

Metering Facilities

In general, very few buildings are equipped with condensation meters unless such buildings purchase steam from an outside source, usually a central plant and even in such cases the usual method is to determine only the total condensation, including steam required for direct radiation, fan heaters, domestic hot water, restaurants, and laundries, etc. The Committee found it necessary in nearly every building selected to install separate meters on the fan heater returns and on the domestic hot water returns in order to obtain the amount of condensation required for the direct radiation only.

Buildings Tested

The Investigating Committee selected eight buildings of similar type and construction in Chicago to make comparative steam consumption tests. Three of these buildings had heating systems equipped with hand control valves on radiators, three were equipped with pneumatic control radiator valves, and two with Direct Control Valves. The buildings selected by the Committee for the test were not picked at random, each of them being representative buildings of their respective kind and well operated, and as far as could be observed they were not overheated. The hand-controlled installations particularly were above the average as far as efficient and careful operation was concerned.

Temperature Records

No record was kept of temperatures maintained in any of the buildings as it was assumed that each building was heated to a comfortable degree, neither was any attempt made to instruct the operators in the operation of the plants or determine in any way the efficiency of the plants. Wherever possible the Committee secured an accurate record of the number of heating hours each day in order to determine the condensation per square foot per heating hour. In some buildings where exhaust steam from generating plants passed into the low pressure header, the actual heating hours were difficult to determine and no record was kept.

Data Tabulated

In addition to the daily meter readings during the 1928-1929 heating season, the following data was tabulated. Average wind velocity and direction; the high, low and average temperature for the period between meter readings; the heating degree days; the total pounds of steam used for the direct radiation for the period; the pounds of steam per square foot per 24 hours; number of heating hours;

Continued on next page

pounds of steam per square foot of direct radiation per heating hour; and the pounds of steam per square foot of direct radiation per degree day. Summary sheets were made showing monthly totals and averages of the above items and from these monthly totals the estimated total steam consumption for the season was obtained. It was assumed by the Committee that the heating loads on the buildings would vary directly with the number of degree days and on this basis a tabulation was made of the number of degree days for each month and the percentage of the total load that each month should consume based on the number of degree days. From this record, the Committee estimated the monthly steam load for the months where records were missing. Due to delays in installing meters in some buildings, the records were not complete for all of the months of the heating season. During the 1929-1930 heating season monthly and semi-monthly readings only were taken and monthly and yearly consumptions calculated from them, as this season's record was used only as a check on the previous year's record.

Correction Factors

Where steam and flow meters were used to measure steam consumption, a pressure gauge was installed and the meter readings were corrected for the varying pressure where necessary. Temperature recorders were also installed in connection with each Cadillac condensation meter so that corrections could be made on these readings where the temperature of the condensate varied materially from 140° which is the temperature for which the meters are calibrated. In order to make direct comparisons between the buildings under test, the Committee felt it necessary to check the amount of direct radiation in each building according to a standard method adopted by them. Each building was checked and the radiation changed to conform to the standard.

Effect of Light Courts

An interesting fact was brought out in connection with the readings taken at one building during the first season, in regard to the condensation per square foot of radiation in rooms on a light court. In this particular building, the heating return lines were so installed that the court radiation could be separately metered from the radiation on outside exposures. Accurate records of the heating hours of the court and outside exposures were kept, and figures reduced to condensation per square foot per heating hour. Over a period of three months a very consistent record was obtained indicating that the condensation rate of court radiation is approximately 44% of the condensation rate of the radiation on the outside exposures. Although the Committee were not willing to present this information as an established fact, they were confident that the results obtained in this building could be duplicated in other buildings of the same type and that the information was of such importance that it could not be overlooked in comparing condensation rates of buildings with and without light courts.

During the 1929-1930 heating season a condensation meter was installed on the light court radiation in another building and temperatures taken comparing outside temperatures with that of the courts and a very definite relation was found between the court temperatures and the condensation rate. On the strength of the above information and after taking observations at each building, the radiation in each building having a light court was corrected so that the condensation rate

Continued on next page

for all of the radiation was brought up to the standard of the building having no court.

Weather Reports

As the meters on the various buildings were read at different hours of the day during the 1928-1929 season, the Committee did not use the published government daily weather records but calculated the temperatures between the meter readings. While in some cases this did not materially affect the temperature records, there were times when temperature changes were rapid and the results varied considerably. During the 1929-1930 season the published government records were used.

The results obtained from these tests are given in tabulated form below:

Building	Control	Condensation per square foot		Average condensation per degree day		Average of two years' records	
		1928-1929	1929-1930	1928-1929	1929-1930	Condensation per sq. ft. per season	Condensation per sq. ft. per degree day
A	Direct	476.0	479.7	.0755	.0761	477.8	.0758
B	Direct	348.6	368.8	.0553	.0569	358.7	.0570
C	Pneumatic	669.5	619.2	.0164	.0984	644.4	.1024
D	Pneumatic	498.3	632.2	.0792	.1004	632.2	.1004
E	Pneumatic	691.5	659.0	.1099	.1048	675.2	.1074
F	Hand	618.8	541.3	.0984	.0861	580.0	.0922
G	Hand	787.0	724.5	.1251	.1152	755.8	.1202
H	Hand	610.0	588.4	.0969	.0935	599.2	.0952

BUILDING A

Building A is a modern tower building, 40 stories high, with a light court from the 6th to 23rd floor. Heating system is a modern vacuum system with Direct Control Valves on all direct radiators. Steam is supplied from a boiler plant. This building operates at higher than average temperatures, due to the nature of occupancy, and for that reason has a slightly higher steam rate for heating.

BUILDING B

Building B is a modern 21 story building with a light court. Steam is supplied from a boiler plant to a modern vacuum system with all direct radiators equipped with Direct Control Valves.

BUILDING C

Building C is a modern 21 story office building with a light court. Steam is supplied to a vacuum system from a street main and all direct radiators are equipped with pneumatic control.

BUILDING D

Building D is a 20 story building with a light court. Steam is supplied from a boiler plant to a vacuum system on which all direct radiators are equipped with pneumatic control.

BUILDING E

Building E is a 21 story building with a light court.

Steam is supplied from a boiler plant to a vacuum system on which all direct radiators are equipped with pneumatic control.

BUILDING F

Building F is a 23 story building without a light court. Steam is supplied from a boiler plant to a vacuum system on which all direct radiators are equipped with hand control valves.

BUILDING G

Building G is a 22 story building with a partially enclosed light court. Steam is supplied from a boiler plant to a vacuum system on which all direct radiators are equipped with hand control valves.

BUILDING H

Building H is a 22 story building with a light court. Steam is supplied from a boiler plant to a vacuum system on which all direct radiators are equipped with hand control valves.

{Signed} C. S. MILLARD,
Chairman, Committee.

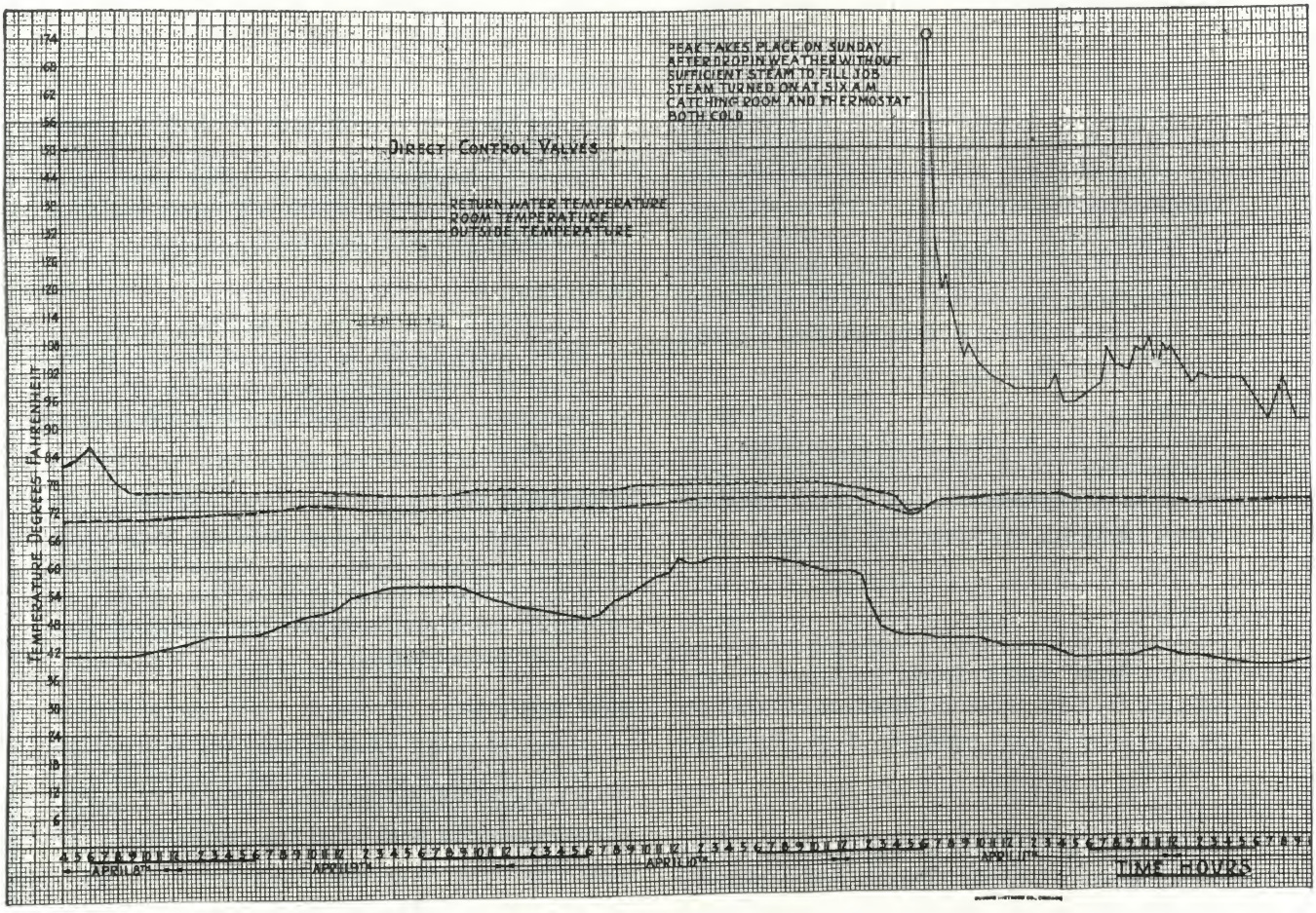
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RESULTS THAT COUNT

The tabulated results of two years' investigation by the Architects and Engineers Investigating Committee should conclusively settle the moot question of steam consumption in office buildings and should further definitely prove that the superiority of Direct Control Valves is effecting substantial economies in heating costs.

The figures incorporated in the committee's tabulation were taken from actual installations in everyday operation over a period of two years and, considering the high standing in the profession of the members of the committee, should be authoritative.

It is of particular interest to note that the tabulation gives Direct Control Valves an average consumption of 418 pounds per square foot per heating season, or .0664 pounds per square foot per degree day as against 650 pounds per square foot per heating season, or .1034 pounds per square foot per degree day, for pneumatic control; and



Results from tests on Direct Control Valve made in room 535,

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645 pounds per square foot per heating season, or .1025 pounds per square foot per degree day, for hand control.

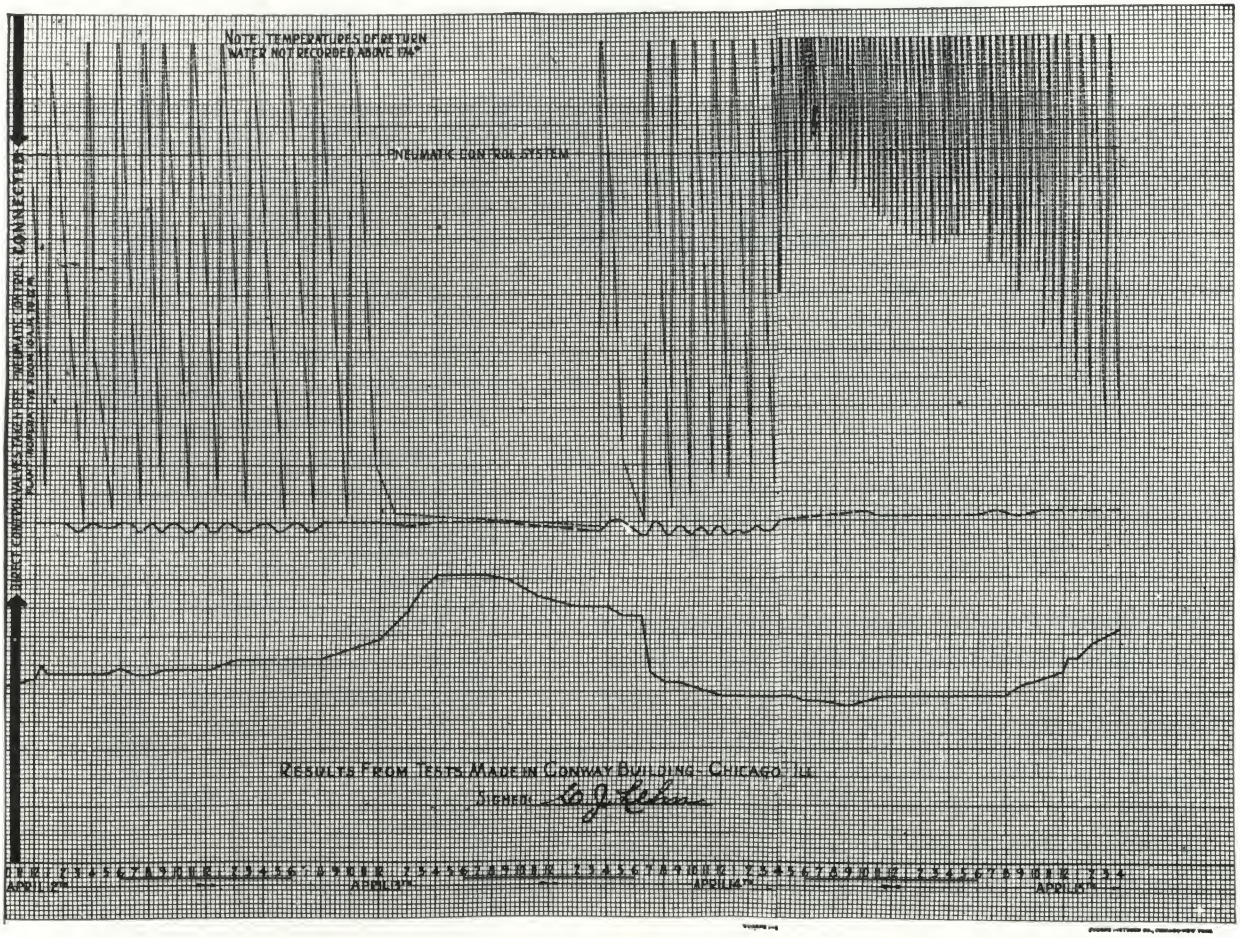
The figures indicate a savings for Direct Control Valves of 35½ per cent over pneumatic control and 35 per cent over hand control.

Such evidence is conclusive proof of the economic soundness of a Direct Control Valve installation.

In addition, it must be admitted that to effect such savings over other types of installations Direct Control Valves must of necessity have afforded to the building occupants a considerable degree of comfort and healthful working conditions by reason of accurately controlled room temperature.

In going over the committee's report, it is to be remembered that the buildings selected for hand operation were of the highest type and unusually well operated. With poorer buildings or poorer operation economies with Direct Control Valves will be substantially increased. A very small percentage of the buildings in the United States are of as high grade a type as were selected for the test.

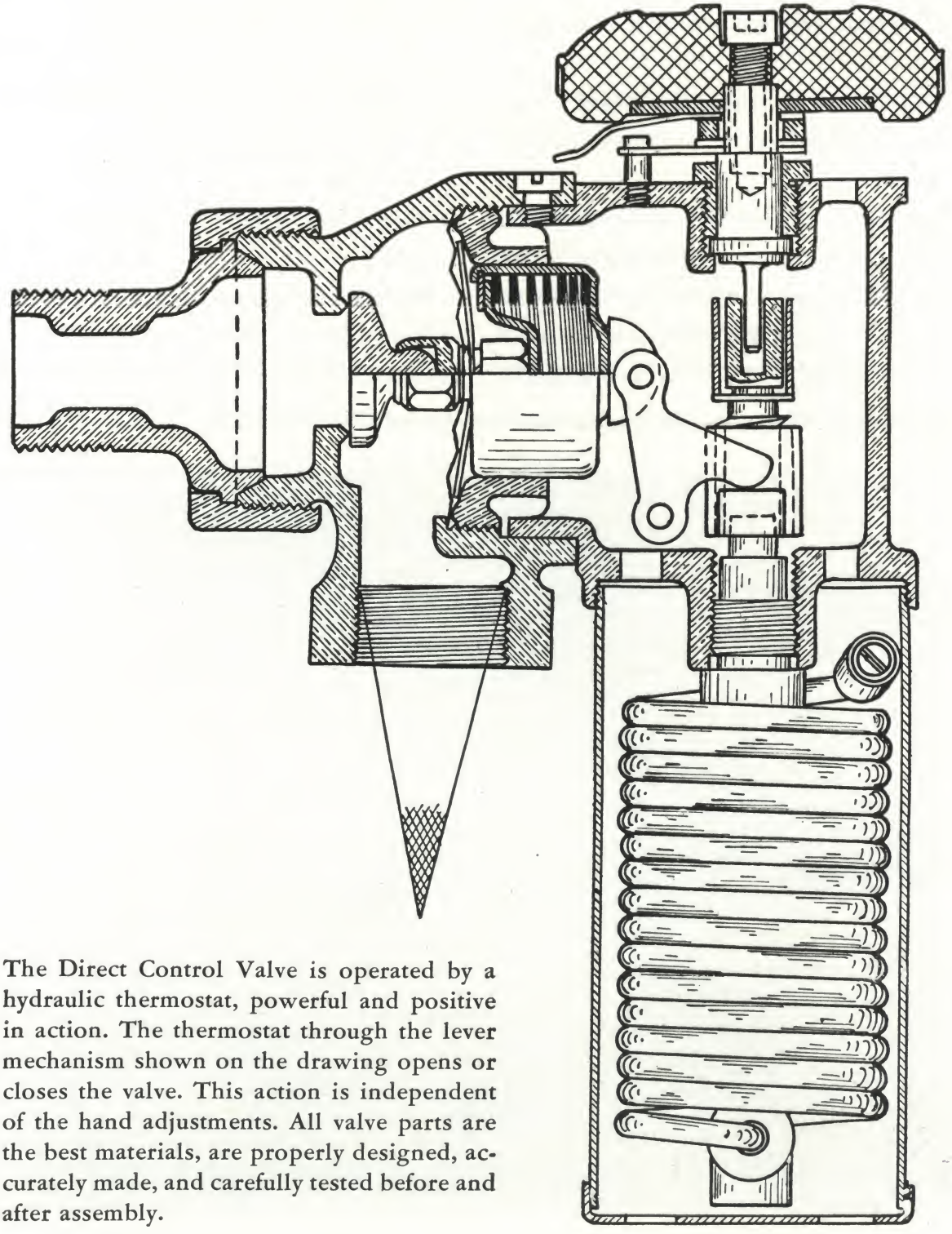
With Direct Control Valves, the steam savings pays for the valves and the temperature control costs you nothing.



Conway Building, Chicago, Ill., April 8-15 inclusive, 1927

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MECHANICAL DESCRIPTION OF THE DIRECT CONTROL VALVE



The Direct Control Valve is operated by a hydraulic thermostat, powerful and positive in action. The thermostat through the lever mechanism shown on the drawing opens or closes the valve. This action is independent of the hand adjustments. All valve parts are the best materials, are properly designed, accurately made, and carefully tested before and after assembly.

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DIRECT CONTROL VALVE

Guarantee and Specifications

Standard Guarantee

The Direct Control Valve Company guarantees that a Direct Control Valve or Valves when installed on sufficient radiation to properly heat the room will maintain a room temperature within the limits of 1 degree F. above and 1 degree F. below the point of adjustment subject to the following conditions:

(a) A sufficient and continuous supply of steam to be available for each radiator.

(b) A sufficient and continuous circulation maintained for properly draining each radiator.

(c) No other uncontrolled radiator or heating element shall be installed in the space to be regulated.

The determination of the room temperature shall be made by means of a test thermometer hung free at approximately the center of the room and 5 feet above the floor but not within 8 feet of the heating elements or outside walls.

The Company agrees to repair or replace without expense to the owner, any defective valves or valve parts which may, with normal use, develop defects within a period of three years from date of installation upon written notification by the owner. The Company is to be given the right of inspecting the valves on the premises.

This guarantee will become null and void if valve or valves, which to the Owner appear to be defective, have been removed from the radiator or have been taken apart or adjusted by others than the Company's representative.

Specifications

The Heating Contractor shall provide and install at the supply connection to each direct radiator (which connection shall be made to the top of the radiator) a temperature regulating valve, as made by the Direct Control Valve Company, Chicago, Ill., which valve shall so operate as to automatically maintain the room temperature at any required point between 00 degrees and 00 degrees.

These valves shall contain a thermostat operating upon a strictly hydraulic principle, shall be of nickel plated finish, and shall be of the following sizes:

For radiators up to 80 sq. ft.	3/4-in. valve
For radiators 80 to 140 sq. ft.	1 -in. valve
For radiators 140 to 250 sq. ft.	1 1/4-in. valve
For radiators 250 sq. ft. and above	1 1/2-in. valve

Make run-outs to the valves one size larger than valve size to a point directly under the valves.

These valves shall be guaranteed to maintain room temperatures within one degree above or below the point of adjustment so long as a supply of steam is available at the radiators. Should any defect appear in any of these valves within a period of three years from the date of delivery, other than that due to normal wear and usage, the same shall be made good without expense to the owner.

(NOTE TO ARCHITECTS AND ENGINEERS)
Use only one of the three paragraphs next below.

(a) Each valve shall be provided with an approved operating wheel and shall be capable of adjustment by the room occupant at any temperature between the points above specified, and it shall be also possible to shut the valve entirely off by hand, if desired.

(b) Each valve shall be provided with an approved operating wheel and with a locking device by means of which the range of adjustment of temperature control may be limited as required.

(c) Each valve shall be provided with a lock shield device and six operating keys shall be provided.

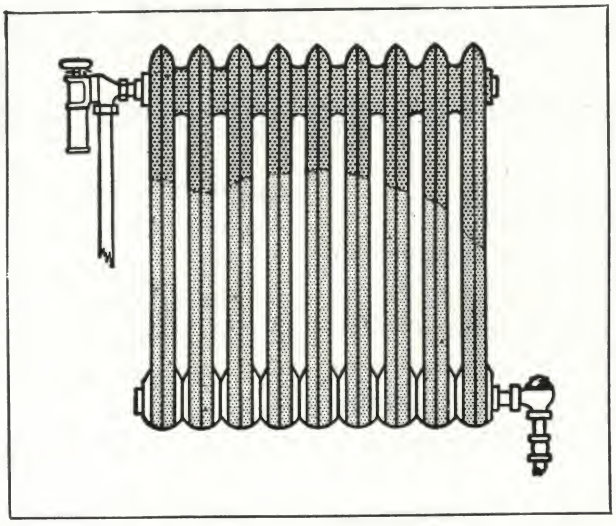
(NOTE TO ARCHITECTS AND ENGINEERS)
(Not to be included in specifications)

Direct Control Valves can be furnished to operate at any desired room temperature, and in other finishes than nickel plate.

Note especially that Direct Control Valves may be used only on two-pipe vacuum, vapor, or atmospheric steam heating systems.

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100% of this average radiator must be installed in your room.



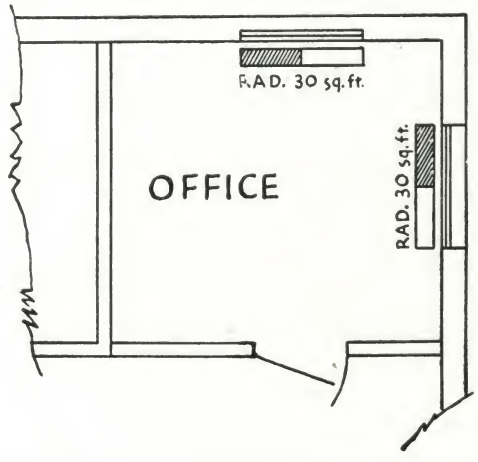
30% of this average radiator (indicated by shaded portion) is the actual average needed.

WHY YOUR RADIATOR OVERHEATS

Engineers and architects, in designing your steam heating system, must, in all cases, install in each room sufficient radiation to heat that room to approximately 70° F. when the outside temperature reaches the minimum for your locality, and additional radiation to shorten the time of "heating up."

Normally the only control you have over your radiator is to turn it on or shut it off. If you turn it on, you put an amount of heat into your room sufficient to heat the room to 70° F. when it is below zero outdoors. The sub-zero condition is present only a small percentage of the year so that at all other times your radiators may be twice too large.

For example, suppose that the office indicated, is located in Chicago and requires 60 sq. ft. of radiation to heat the room to 70° F. when the outside temperature is 10° below zero. Government reports indicate that the average temperature during the heating season in Chicago is 36° F. The amount of radiation required to heat this room to 70° F. when the outside temperature is 36° F. would be 26 sq. ft. Consequently, under average conditions, this room has over twice as much radiation as is required and will as a result, with hand valve control, greatly overheat, except when the outside temperatures reach 10° below zero.



With Direct Control Valves installed in this room, the flow of steam to each radiator would be restricted to the exact amount needed to keep the room at a predetermined temperature, irrespective to the outside temperature. *In addition to providing temperature control, the Direct Control Valves would actually perform the effect of changing the size of your radiators to suit the requirements of each day of the heating season.*

Continued on next page

STANDARD APPLICATIONS

Direct Control Valves are being successfully used in controlling enclosed cast iron radiators, enclosed copper and brass radiators, and various types of newly designed cast iron radiators used in connection with special recesses or covers which form a part of the window sills, and in controlling various types of unit heaters and unit ventilators.

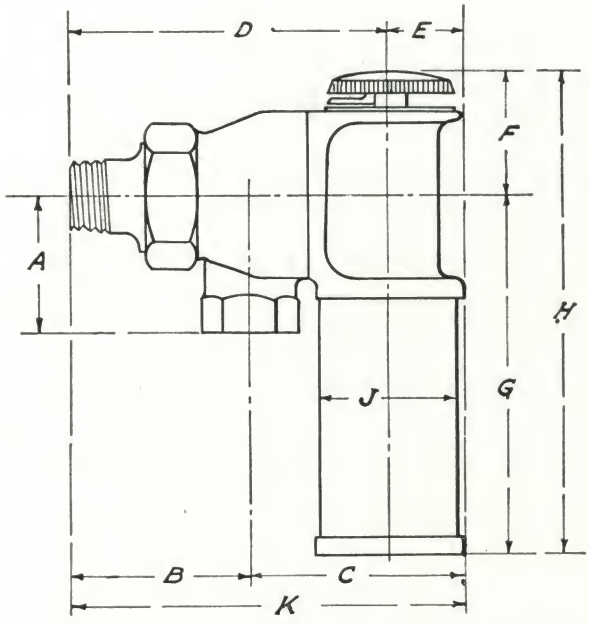
Enclosures – Direct Control Valves operate successfully on any efficient type of radiator recess provided that the valve can be installed in the same stream of air that circulates through the radiator.

For such installations, Direct Control Valves can be furnished with extended stems with operating handles and dials.

Good engineering practice indicates that all recessed radiators should be accessible by means of removable grilles, for reasons of maintenance and sanitation. Beyond this, Direct Control Valves require no special consideration except that the length of the recess must be sufficient to accommodate the roughing-in requirements of the valve.

Unit Heaters – Direct Control Valves are being used extensively in the control problems involved in the use of unit heaters and ventilators, both on steam control to the units and on positive or graduated dampering control.

Continued on next page



SIZE OF VALVE	TABLE OF DIMENSIONS									
	A	B	C	D	E	F	G	H	J	K
3/4"	1 15/16	2 7/8"	3 1/8"	4 15/16	1 1/16"	2 1/8"	5 1/2"	7 5/8"	1 15/16"	6"
1"	2 1/16	3 1/8	3 1/4	5 5/16	1 1/16	2 1/8	5 1/2	7 5/8	1 15/16	6 3/8
1 1/4"	2 1/2	3 1/2	3 3/8	5 7/8	1 1/16	2 1/8	5 1/2	7 5/8	1 15/16	6 7/8
1 1/2"	2 5/8	3 3/4	3 5/8	6 3/8	1 1/4	2 5/16	5 3/8	7 11/16	2	7 3/8

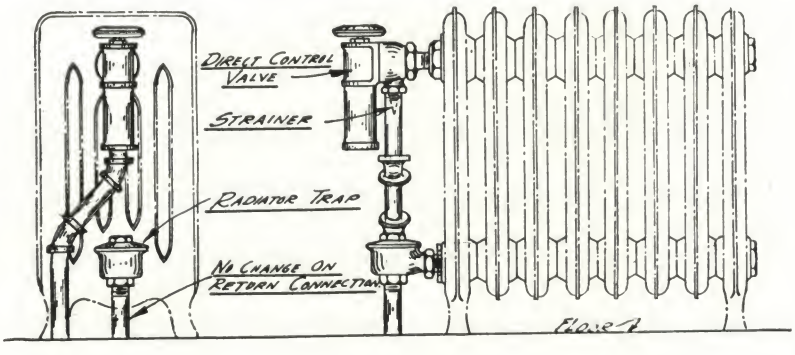
TABLE OF CAPACITIES

Up to 80 square feet..... 3/4-in. valve
81 to 140 square feet.....1 -in. valve
140 to 250 square feet.....1 1/4-in. valve
250 square feet and above..1 1/2-in. valve

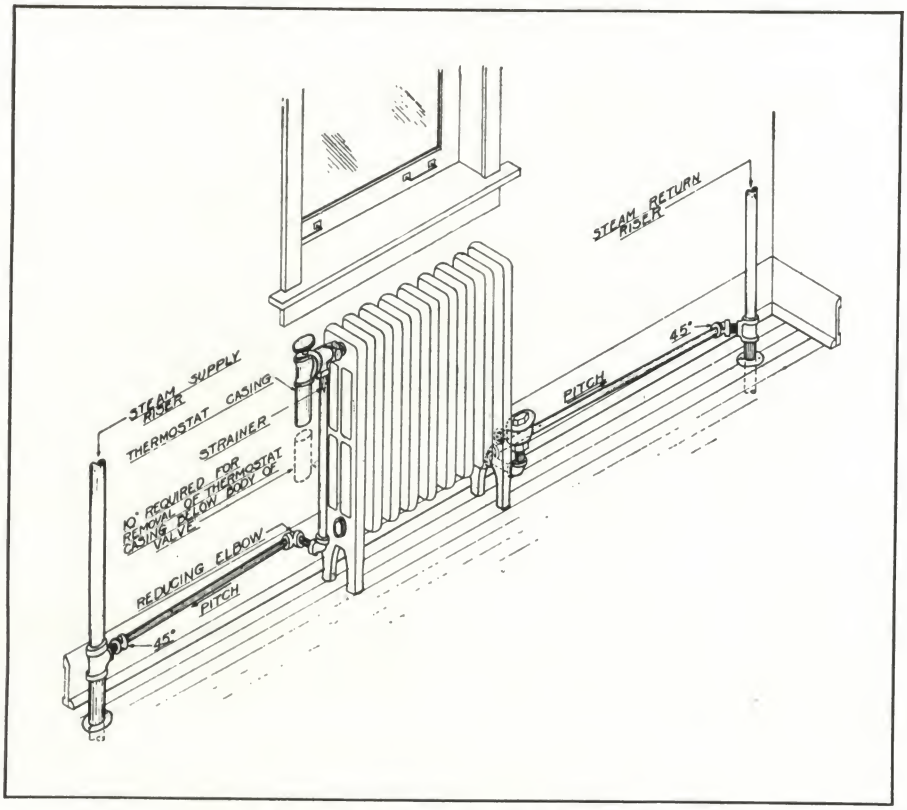
This schedule applies to Direct Control Valves used on direct steam radiation operating on a vacuum steam heating system, with a minimum outside temperature of 30 degrees F. and an inside temperature of 60 to 80 degrees F. For the capacities of Direct Control Valves operating on vapor heating systems and under other temperature conditions apply to the Direct Control Valve Company.

DETAIL OF TYPICAL INSTALLATIONS

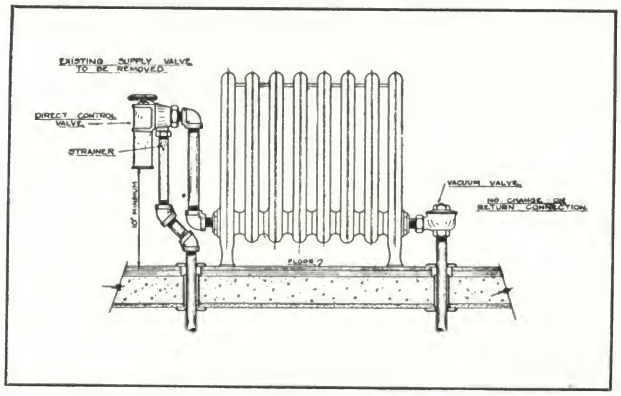
Installation on Standard C. I. Radiation

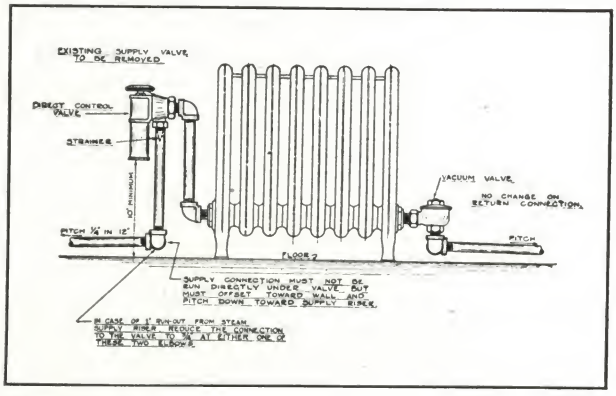


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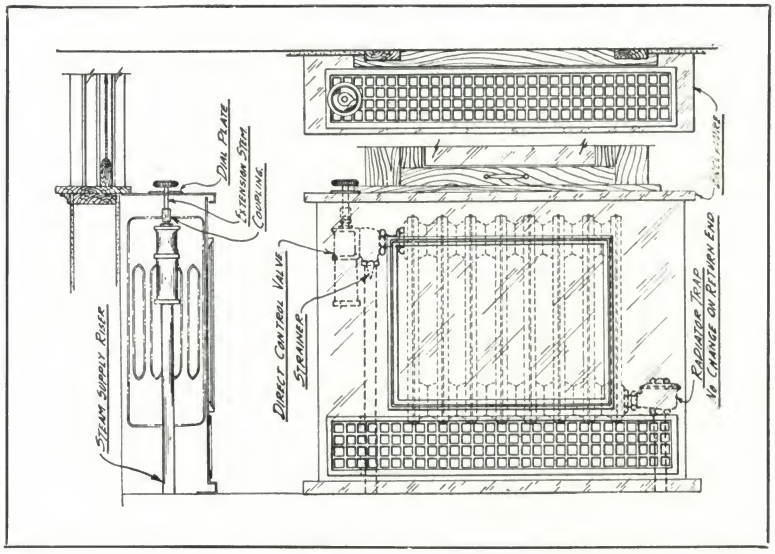
Installation on Standard Cast Iron Radiation with Exposed Run-outs



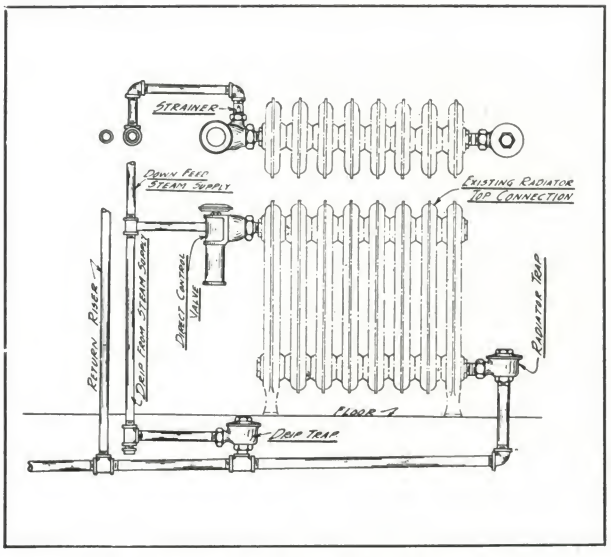


Typical Inslallations on Bottom Inlet Radiation

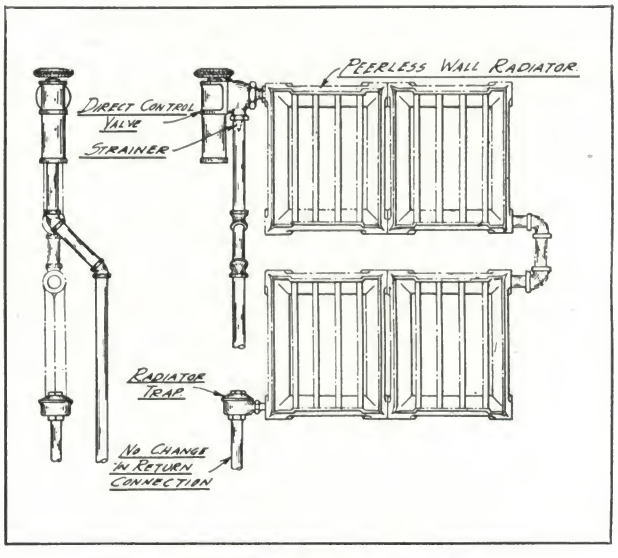
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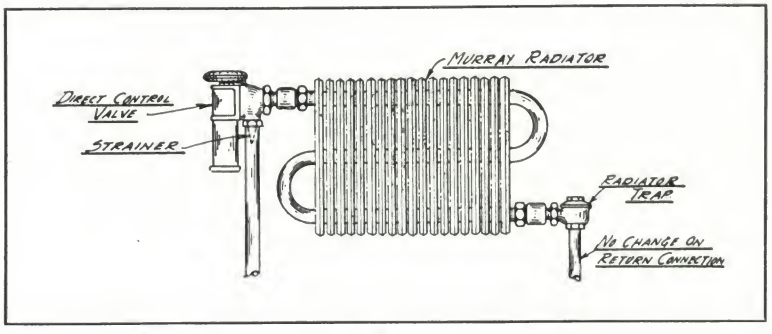
Installation in Enclosure



Installation on Down Feed System



Installation on Wall Radiation



Installation on Murray Radiation

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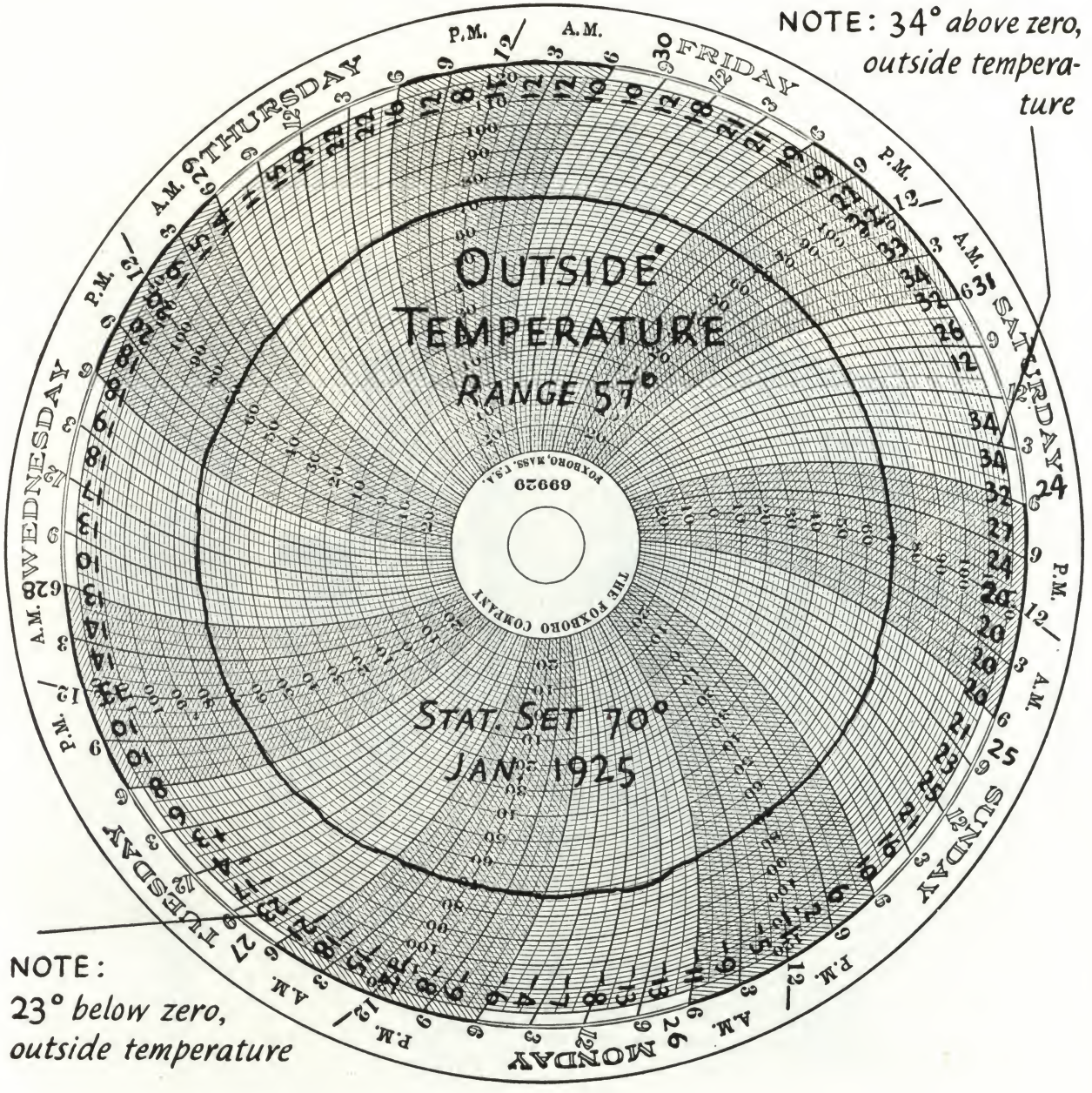
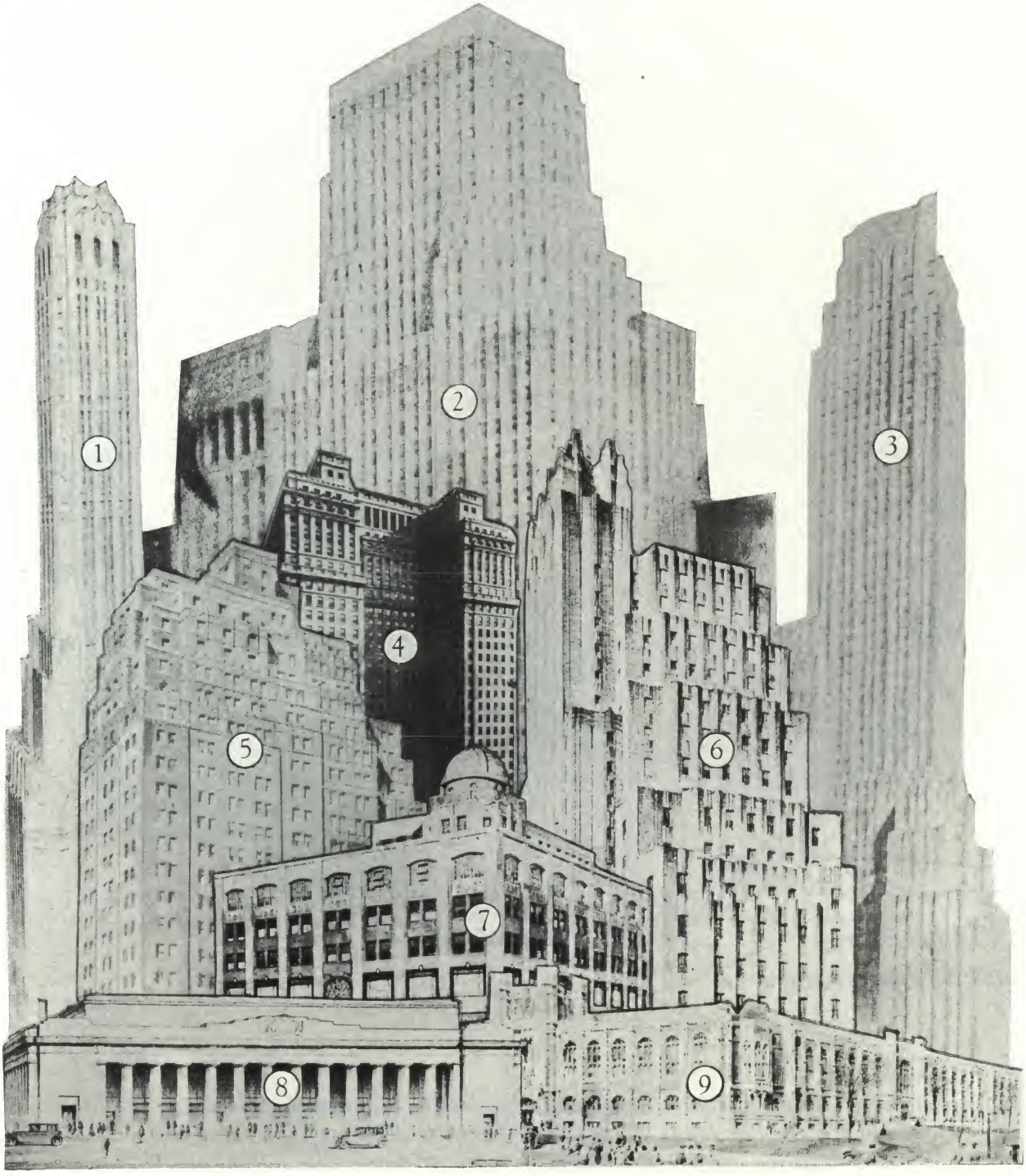


Chart showing uniform temperature obtained by the use of the Direct Control Valve. The range of outside temperature during the period of this chart reading was 57°, the minimum being 23° below zero and the maximum 34° above zero. Record taken in St. Paul, Minn., January 24-31, 1925.

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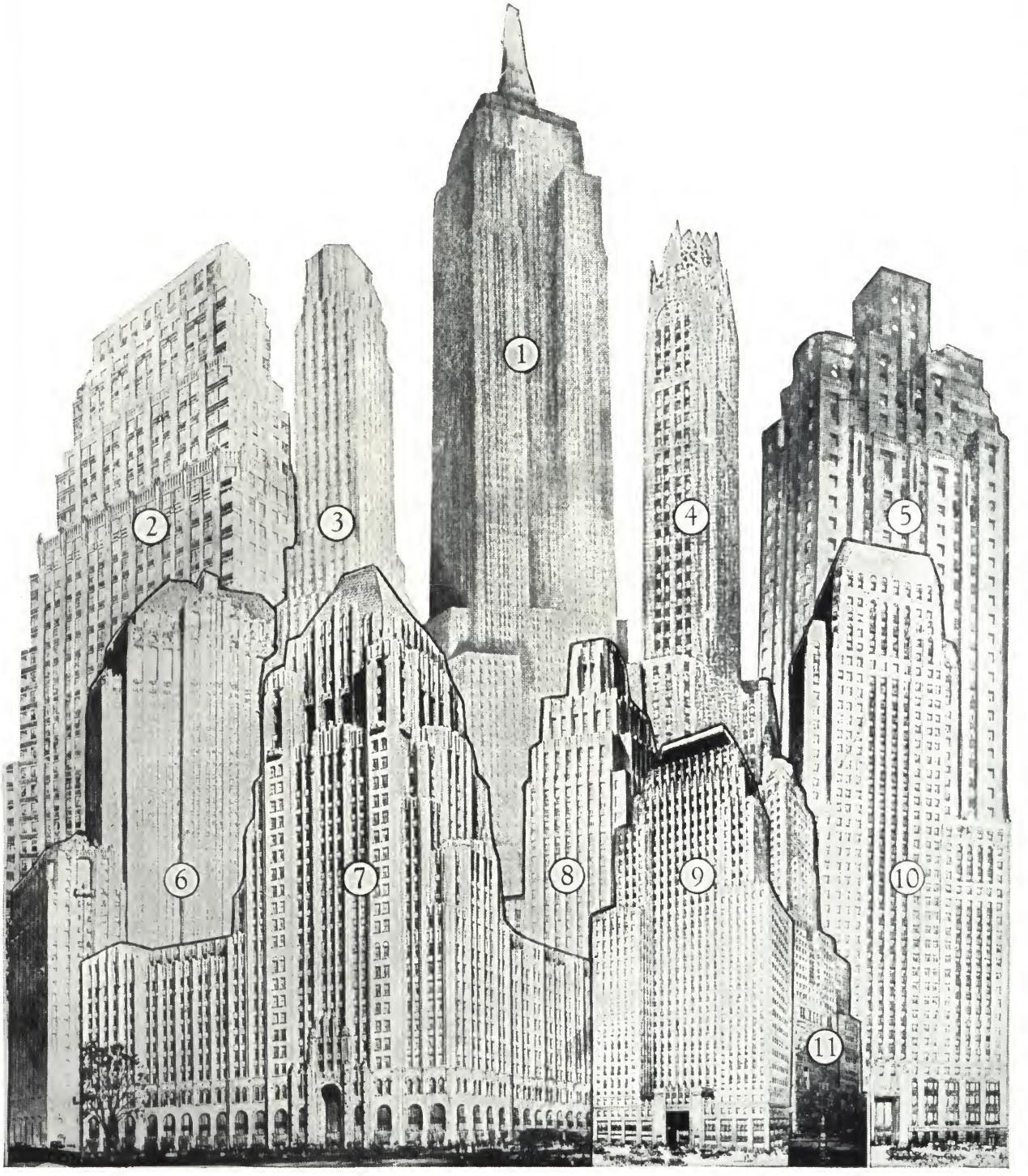
CONCENTRATED EVIDENCE



1. Farmers Trust Co. Building, New York, N. Y.
2. Salmon Tower Building, New York, N. Y.
3. 500 Fifth Avenue, New York, N. Y.
4. Fidelity Philadelphia Building, Philadelphia, Pa.
5. New Weston Hotel, New York, N. Y.
6. New York Telephone Co. Building, New York, N. Y.
7. Chapin Building, Chicago, Ill.
8. North Broad Street Station, Reading Ry. Co., Philadelphia, Pa.
9. Library Building, Oklahoma State University, Norman, Okla.

Continued on next page

CONCENTRATED EVIDENCE



1. Empire State Building, New York, N. Y.
2. 21 West Street Building, New York, N. Y.
3. Irving Trust Co. Building, New York, N. Y.
4. R.C.A.-Victor Building, New York, N. Y.
5. Hotel Wellington, New York, N. Y.
6. Chicago Civic Opera Building, Chicago, Ill.
7. Fisher Building, Detroit, Mich.
8. Reynolds Tobacco Co. Building, Winston-Salem, N. C.
9. Kopper Building, Pittsburgh, Pa.
10. Foreman National Bank Building, Chicago, Ill.
11. Medinah Athletic Club, Chicago, Ill.

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